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ON A FŒTAL KANGAROO AND ITS MEMBRANES.

BY HENRY C. CHAPMAN, M.D.

Since the publication, nearly fifty years ago, of Prof. Owen's invaluable paper[1] "On the Generation of the Marsupial Animals," in which the fœtal Kangaroo and membranes were first described, no further contribution has been made to our knowledge of this very important subject. Indeed some naturalists at the present day seem indisposed to accept Prof. Owen's statement that there is no connection in the Kangaroo between the fœtal membrane and the uterus, or, in other words, that no placenta is developed; and that, therefore, the division of the mammalia into non-placental and placental is not a valid one. Even though the present communication should not contain anything particularly new, I trust, however, that it will not be received without interest, if for no other reason than that it comfirms essentially Prof. Owen's descriptions.

One would have naturally supposed that, during the past half century, among all the Kangaroos killed in Australia and opened in various zoological gardens, at least one fœtal Kangaroo would have been found. As a matter of fact, however, this does not appear to have been the case, or, at least, if such was found, no record was made of it. Impressed with this fact, I never failed to examine the generative apparatus in the female Kangaroos which died from time to time in the Philadelphia Zoological Garden, with the hope that I might obtain an embryo. In September, 1879, I was successful, finding the specimen which forms the subject of the present communication, and to which I incidentally alluded in a previous communication to the Academy.[2]

The female Kangaroo, in which I found the embryo, was a fine example of the *Macropus giganteus*, and had taken the male about fourteen days before its death, which was caused by injuries inflicted upon itself, due to a fright incident to the boxing the animal for shipment. The embryo, Pl. XX, was, therefore, not more than fourteen days old. On opening the uterus of the left side, which was considerably swollen, the embryo Kangaroo was seen through the transparent chorion. The chorion, which was thickened in places, insinuated itself between folds, into which the lining membrane of the uterus was thrown. The chorion was, however, entirely free from villi or villous processes of any kind, and was perfectly separable in its entire extent from the uterine surface. Indeed it was readily turned out of the uterus intact. On opening the chorion, the embryo Kangaroo was seen inclosed in a very delicate amnion, which was easily lacerated. What at once struck me, on opening the chorion, was the large size of the umbilical vesicle and the undeveloped condition of the allantois, which, though small, was undoubtedly present, consisting of a pear-shaped vesicle or diverticulum from the posterior part of the intestine. The umbilical vesicle adhered to the chorion by that part of its surface most remote from the umbilicus. The line of demarkation between chorion and umbilical vesicle being indicated by a circular blood-vessel. When in the fresh condition, the umbilical vesicle was seen to be highly vascular. The blood-vessels that ramified over its surface consisted of two veins and an artery. The veins began as one vessel from the under surface of the liver, which diverged at the umbilicus and united again on the umbilical vesicle as a terminal or marginal vein, *i. e.*, the circular vein just referred to, and which indicated the line of contact of the umbilical vesicle with the chorion. The third vessel was an artery, and through the mesenteric could be traced to the aorta. These vessels evidently correspond to the omphalo-mesenteric or vitelline veins and arteries of other vertebrate embryos as seen, for example, in the embryo chick. The disposition of the umbilical vesicle, with reference to the chorion (its large size and vascularity), reminded me also very much of the rabbit or rodent type of development. While, as we have just seen, the umbilical vesicle was in contact with the chorion, the rudimentary allantois, on the contrary, hung freely by its pedicle or urachus in the space between the amnion, the stem of the umbilical vesicle, and the chorion.

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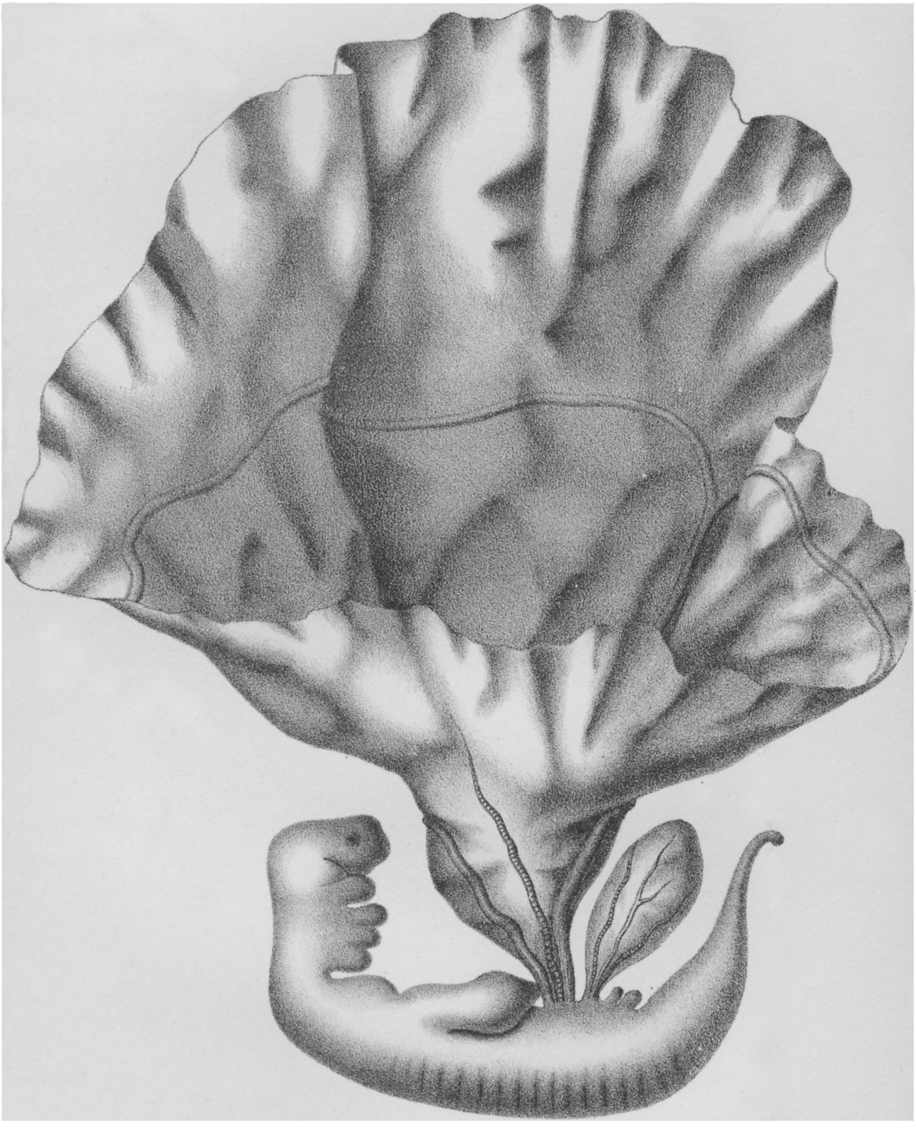
[1] Philos. Transact., 1834.

[2] Placenta of the Elephant, Journal of Acad., vol. viii, p. 5.

When the allantois was first examined, there could be distinctly seen three very fine vessels, two of which appeared to come from the aorta and corresponded therefore to the umbilical or hypogastric arteries of the placental mammals, while the remaining vessel I considered to represent the umbilical vein of the same. The small size of the allantois and the rudimentary condition of its blood-vessels taken in connection with the length of the embryo and the short time that the latter remains in the uterus, makes it impossible for me to think that in the Kangaroo a placenta is ever developed. I use the word placenta in the sense ordinarily accepted, meaning a structure which consists of the interlacing of the allantoic blood vessels with those of the decidua serotina of the uterus, that is, of that part of the hypertrophied mucous membrane of the uterus in contact with the ovum. Further, that while the umbilical vessel is fused through part of this surface with the chorion, the chorion is only in contact with the inner surface of the uterus, not adhering to it in any way. The disposition of these membranes in the Kangaroo embryo is therefore different from the so-called placenta of certain Sharks, which consists in the interlacing of the omphalo-mesenteric blood-vessels with those of the uterus. This structure in the Sharks, though called a placenta, is not homologous with the mammalian placenta, this consisting, as we have seen, of the allantoic vessels and those of the uterus. The Kangaroo cannot be said, therefore, to have a placenta in either sense in which that word is used. The small size of the embryo Kangaroo at birth, would lead me to suppose that it drew its nourishment from the umbilical vesicle like the reptile or bird, rather than from the uterine walls, as in the mammal. If the uterus does contribute to the nourishment of the fœtal Kangaroo, such nutriment must osmose through the omphalo-mesenteric vessels. The contact of the chorion with the uterus, however, is of a very adventitous character. The embryo Kangaroo itself measured six-eighths of an inch in length from the mouth to the root of the tail. The latter was one-eighth of an inch long. The mouth was open, and the tongue, though large, was not protruded. The palpebral folds were not developed. There was no sign of an auricle. Four branchial clefts could be distinguished. The anterior extremities were well developed, but the digits had not appeared. The posterior extremities, were represented only by small buds, not very apparent except with a lens. Indications of the ribs were distinctly visible. The membranous spinal cord could be seen; the elements of the vertebræ being as yet ununited. A penis was visible just in front of the anus. On the supposition that the theory of evolution is true, one would naturally expect to find forms intermediate in their structure and development between the reptiles and birds on the one hand and the placental mammalia on the other. As is well known, in the structure of its skeleton and generative apparatus, the *Ornithorynchus* resembles very closely the reptile and bird, while, as we have just seen, the fœtal membranes of the Kangaroo recall the corresponding parts in the reptilian-bird type and foreshadow those of the placental mammal. If the parts in question have been truthfully described and correctly interpreted as partly bridging over the gap between the non-placental and placental vertebrates, they supply exactly what the theory of evolution demands, and furnish, therefore, one more proof of the truth of that doctrine.



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CHAPMAN ON FOETAL KANGAROO.